

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



Amateur Satellite Report is endorsed by the
American Radio Relay League as the special interest
Newsletter serving the Amateur Radio Satellite Community

Number 115/116
January 16, 1986

Editor: Vern Riportella, WA2LQQ
Contr. Editor: Harold Winard, KB2M
Managing Editor: Bob Myers, W1XT
Copyright 1986 by Amateur Satellite Report

Short Bursts

- Astronaut Tony England, W0ORE, will be the special guest speaker at the AFCEA Western Conference January 23 in Anaheim California. Tony will address the traditional Amateur Radio Luncheon of the convention at the Disneyland Hotel. Tony's topic is to be Amateur Radio and Youth In Space. W0ORE flew the SAREX-1 experiment last August. Also on hand will be AMSAT Chairman W6SP and President WA2LQQ. Contact W6SP, 213-544-2543, for details.
- AMSAT has announced the immediate availability of a new publication aimed at both the beginner and experienced OSCAR 10 user. Titled the *AMSAT Phase III Satellite Operations Manual*, it explains in easily understood terms many of the intricacies of working OSCAR-10. The graphic presentations of the orbits and the definitions of terms are especially helpful. With over a dozen authors and editors, the manual has been published in conjunction with Project OSCAR. It is available now from AMSAT HQ for a \$15 donation. Write AMSAT, P.O. Box 27, Washington, D.C. 20044.
- Project OSCAR has announced it will once again publish an orbital prediction calendar. The 1986 edition will feature RS5 and 7, UO-9 and 11 and AO-10. For the low earth orbiters, the calendar will present the time and longitude for all ascending nodes. For AO-10, the calendar will present the time and sub-satellite point for each apogee and the argument of perigee. The AO-10 predictions are expected to be much improved over the 1985 listings since a year's experience has been attained and many of the variables are now well-characterized. The 1986 calendar is available from Project OSCAR for a minimum \$10 donation (North America, \$12 elsewhere) to Project OSCAR, P.O. Box 1136, Los Altos, CA 94023.
- Concepts for the design and implementation of the next generation of OSCARs is the objective of several study committees now being formed. Over the next several months these groups will examine possible follow-on projects to Phase 3C. Individuals interested in working with this program should express that interest in writing to AMSAT President WA2LQQ at P.O. Box 177, Warwick, NY 10990.
- The first trial run of the Mode L portion of the ZRO-Memorial Technical Achievement Award test was held on January 1 at 2230 UTC. The downlink was 436.200 MHz. This was not a record run but rather a practice run.

- A special callsign, ZS6JCF, has been issued to celebrate the 100th anniversary of the city of Johannesburg. The call ZS6JCF (Johannesburg Centenary Festival) will be used throughout 1986. Watch for ZS6JCF on AMSAT OSCAR 10 Mode B beginning January 11 between 1200 and 1500 UTC. Mode L activity will be announced later. A special gold leafed QSL card will be issued for all satellite contacts.
- RS-9 and RS-10 are complete, tested and ready for launch according to Pat Gowen, G3IOR, quoting Leo Labutin, UA3CR. The launch has slipped slightly to February and it now appears the two will be launched separately. The RS-10 Mode T downlink passband has been specified as 145.957 to 145.997 MHz with beacons at both ends. The uplink is thought to be in the vicinity of 21.26 to 21.30 MHz. The UHF beacon at 435.395 MHz remains unlicensed and may not be turned on immediately.



JAMSAT liaison to AMSAT "TAC", JA1PKI, explains JAS-1 to the Space Symposium.

First ZRO Z8 Awarded to Idaho Station

Satellite veteran Jeff Bishop, W7ID, of Boise Idaho has distinguished himself and his fine station by attaining the unprecedented receive sensitivity rating of Z8. At that level Jeff was copying carefully calibrated CW signals fully 24 decibels below the Mode B beacon. He achieved this unique performance level while participating in the November 24, 1985 test session. The results of that session were announced recently by Test Conductor WA2LQQ. While about 10 individuals have achieved Z7 indicating 21 dB below the beacon, W7ID's report is clearly the best of the several hundred already participating.

Jeff's Mode B station comprises 4 homebrew 9 element crossed log-periodic antennas with a homebrew GaAsFET preamp and 75 ohm CATV hardline. His receiver is an IC-271A. He uses a Datong audio filter squeezed down to about 40 Hz bandwidth to enhance readability. Until W7ID's submission, it was thought Z8 highly unlikely by anyone. At the level Jeff copied, the majority of the rf energy at his antennas came from the AO-10 transponder noise floor and various cosmic noise sources. The combination of excellent equipment, quiet environment and superb radio ears seems to have propelled W7ID into the unquestioned lead in the competition having attained the highest rating in the test and, in fact, the highest rating even offered.

AMSAT congratulates Jeff Bishop, W7ID, on his unique achievement.

Other results reported by WA2LQQ included:

From the 20 October 1985 Test:

Attaining Z2 was WB6GFJ Attaining Z4 was WA3YGQ
Attaining Z5 was WA0NZI/HI8
Attaining Z6 were N1DBB, K6WE, VE3HD, W8PGP,
WA1HUM, W0EOZ, VE5XU, WD9IIC, K4TWJ
Attaining Z7 were W3KH, WB9MJN

From the 24 November 1985 Test:

Attaining Z5 was KJ4BF
Attaining Z6 were WB6GFJ, ZL1AOX, WD9IIC, W6MFO
Attaining Z7 were KA5DNP, W8GQW, LU8EBH

From the 01 January 1986, the first results so far are:

Attaining Z3 was W0ROD
Attaining Z5 was W6SYA
Attaining Z7 were W5LTR, K2RDX

Plans are to begin ZRO tests in Region 1 this Spring under the guidance of SA AMSAT. A sponsor for ZRO tests in Region 3 is being sought.

New AO-10 Operating Schedule

AMSAT OSCAR 10 controller Ian Ashley, ZL1AOX, has placed an interim operating schedule in effect January 14. The schedule will be in effect until about January 20 when it will be further modified. A major attitude change is planned for about January 16.

Current Schedule:

Mode B	MA 040 to 064
OFF	MA 065 to 076
Mode B	MA 077 to 119
Mode L	MA 120 to 136
Mode B	MA 137 to 180
OFF	MA 181 to 039

The tentative schedule beginning January 20 is:

Mode B	MA 030 to 199
Mode L	MA 200 to 216
Mode B	MA 217 to 225
OFF	MA 226 to 029

This schedule is expected to be in effect until early March. As always, it's a good idea to monitor the beacon for advisories on schedule changes.



Space Symposium speaker Bob McGwier, N4HY, tells of his eclipse prediction methods.

Packet Survey Begun

Packet Radio bulletin boards are proliferating especially in North America. AMSAT New Hampshire Area Coordinator Paul Roemer, KG6LC, is conducting a survey to determine how many in the AMSAT leadership community are currently on Packet Radio. Paul feels the evolving network of terrestrial, hf and future satellite packet links will provide an important communications vehicle for AMSAT managers.

If you are an AMSAT officer, manager or appointee and currently have packet capability, please drop a note to Paul, KG6LC at packet bulletin board W0RLI-1 or, if you prefer, Paul Roemer, KG6LC, P.O. Box 1472, Derry, NH 03038. Submissions should include full name, callsign, AMSAT position and call of the packet bulletin board which serves your area, for example, W0RLI-1 or W3IWI-1.

A directory will be prepared from the responses received and will be distributed accordingly. Your inputs are cordially invited.

MARCE Heard Direct And Through AO-10!

Reports are filtering in at press-time of success both in copying MARCE 70 cm telemetry direct from Shuttle Columbia and as relayed through AO-10, Mode B.

After an abortive attempt on STS-007 more than a year ago, MARCE finally was launched with Shuttle Columbia at 11:55 UTC, January 12. Columbia lofted perfectly to orbit after an unprecedented series of delays. Within hours reports began filtering in to AMSAT Coordinators and MARCE HQ at the Marshall Space Center in Huntsville, AL. First positive reception report came from Junior De Castro, PY2BJO, in Sao Paulo. Junior is BRAMSAT (Brasil AMSAT) President and caught the synthesized voice telemetry on tape beginning at 00:59:45 UTC January 13 and continuing through 01:09:00 UTC. (See related story.)

The telemetry told MARCE managers for the first time that the GAS can was definitely turned on and functioning normally. On its previous trip to orbit GAS 007 was not activated due to a procedural error by the payload specialist.

Later on January 13 numerous reports were sent to AMSAT and thence to MARCE project officials. These reports included the first confirmed reception of MARCE telemetry relayed through AMSAT OSCAR-10. Graham Ratcliff, VK5AGR, and Ian Ashley, ZL1AOX, both reported successful reception of the relayed telemetry beginning at 04:49 UTC, January 13, when AO-10 was at MA 171.

This is the first occasion on which telemetry from one Amateur Radio space experiment has been relayed to earth by a second Amateur Radio experiment. This achievement was thought highly improbable, at best, by most who analyzed the problem. The telemetry relay models in a modest way the TDRS (Telemetry Data Relay Satellite) relay of Shuttle scientific telemetry itself as employed by NASA.

In terms of historic significance, the AO-10 relay of MARCE telemetry ranks with the first satellite to satellite QSO ever performed by anyone. This occurred when signals were relayed from AO-7 to AO-6 using a Mode B to

Mode A relay scheme. This was first accomplished by numerous stations in 1975 and reported by Perry Klein, W3PK, and Ray Soifer, W2RS, in Proceedings of the IEEE Letters, October 1975, pp. 1526-1527.

The relay of telemetry from Shuttle/MARCE through AO-10 to the ground must be viewed in a similar historic perspective. Although not the first telemetry relay through a satellite, the MARCE-OSCAR achievement is significant because of its extreme difficulty. It also points to the superb sensitivity of the AO-10 Mode B receiver. The MARCE up-link rf was only 6 watts ERP.

Other direct MARCE reception reports were submitted by JH1RNZ (via JR1SWB), ZS6AKV, 5Z4EG (via ZS6AKV), WH6AMX, and WA5NOM. Unconfirmed reports had at least one California station copying the relayed AO-10 telemetry.

AMSAT Letters of Recognition will be sent to individuals who successfully received the direct, 70 cm downlink of MARCE. A special AMSAT Technical Achievement Award will be sent to all who copied the MARCE telemetry relayed through AO-10. Submit audio cassettes (with transcripts if possible) to: Julian Macassey, N6ARE, 475 North Daisy Avenue, Pasadena, CA 91107.

Various Observers Report MARCE

Per ZL1AOX January 13

Here is a report on the day's activities from ZL1AOX:

The MARCE experiment was copied on all three orbits this afternoon. The orbits were at 03:43:10, 05:17:40, & 06:53:05. Two frames were copied from the first AOS and several from each of the other two. Graham, VK5AGR



Former Video Tape Librarian Roger Johnson, WB0GAI, pitches in to tape the Symposium.



Vic Ruebhausen, W6WNK (right) accepts Top Area Coordinator Award from President WA2LQQ.

reported having heard the relay via AO-10 and we were able to copy at this QTH also from 13/0459 until Mode B switched OFF. Signals were up to S3 but very difficult to decode. If the signals had been SSB or CW there would have been no trouble to copy TLM. There will not be any extension of Mode B time due to the poor sun angles at the moment. Thanks for the MARCE to AO-10 window info — it seems very accurate. Vy 73 Ian ZL1AOX & Steve ZL1UNI & Mark Shepherd.

Per JR1SWB January 13

JH1RNZ (whom you can find in the ARRL's film on SAREX1) received signals from MARCE this morning.

13th. Jan. 1986 at 0016 UTC
WA4S?? 900 32210Z 255 255 1?2 141 139 180 157 022
239 4?? WA4S??

Per JR1SWB January 13

JH1RNZ again got signals at 2119 UTC. Following is his report "as is". I asked him to send the tape to MARC.

QST QST QST QST FROM WA4NZD 902 14 42Z 00Z 255
190 126 196 168 248 152 035 233 Z89 915 7 00 00 00 00
00 00 78 95 92 00 09 FROM WA4NZD OUT

Per ZS6AKV January 13

Received MARCE telemetry Jan 13 at 2050. Good signals for short period. After lots of "drama" at Nairobi end managed to get them to get last portion of 2049 on the air. Congratulations to Marce project managers. Amateur radio has done it again! 73 Hans.

Per WH6AMX January 13

MARCE transmissions were received at 2154 Z direct from the shuttle this morning. Signals were great considering the max 5 degree elevation for Hawaii on Orbit #23.

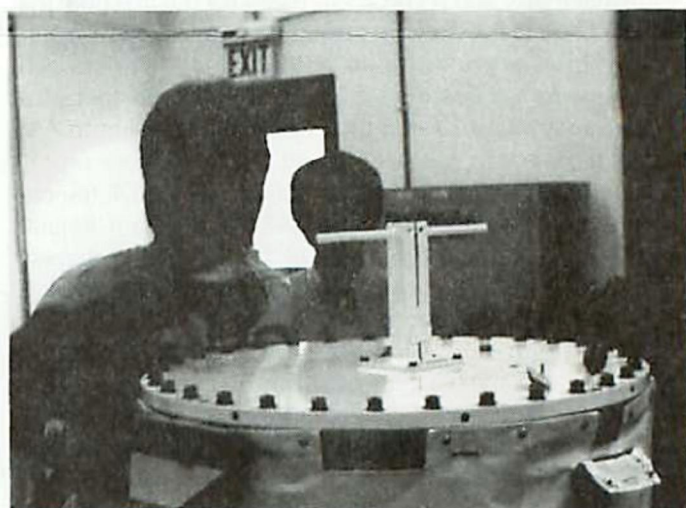
Per WA2LQQ January 13

PY2BJO in Sao Paulo has made the first confirmed reception of MARCE telemetry! Reception at PY2BJO was at 13 Jan. 86 from 00:59:45 to 01:09:00. The voice synthesized telemetry was good copy at his QTH except for a couple of missing elements when he could not keep his very narrow beam on target.

Here is PY2BJO's report:

Time: 00121	Time: 00122	Time: 00123
Status 10	Status 10	Status 10
Data 1 ???	Data 1 ???	Data 1 255
2 255	2 ???	2 255
3 099	3 100	3 099
4 144	4 144	4 144
5 141	5 142	5 142
6 183	6 184	6 ???
7 158	7 157	7 ???
8 022	8 022	8 022
9 239	9 238	9 239

From Ed, W4QAU, we now have confirmation that MARCE did go on about 5 minutes later than planned, i.e., on at 23:45. This by itself would not have prevented 5Z4EG in Nairobi from acquiring tlm data beginning at estimated AOS of 23:46:30. However, we have also confirmed our earlier suspicion that the attitude of Columbia has been changed to a so-called solar inertial attitude to warm a cold Auxiliary Power Unit (APU). The result is that the cargo bay was not earth-pointing at the time 5Z4EG was listening and it is likely Columbia's payload bay was already shifted towards the sun when 5Z4EG was listening.



MARCE antenna installed on the gas flight canister lid, ready for the STS-41G flight.

Weak MARCE telemetry was heard at the Johnson Space Center by Gil, WA5NOM.

The solar inertial attitude of Columbia will hurt the direct telemetry downlink effort but, conversely, could be a boon to the AO-10 relay attempts since the bay will now be exposed to the high-flying AO-10 for much longer periods.

Therefore, recommend all stations observe the AO-10 passband at 145.972 ± 12.7 kHz for the tlm. This could be a bonanza if QRP normal ops on AO-10 prevails. Pass the word!

Iowa Group Completes Tests Of SAREX-2 TNC Software

by Ralph Wallio, WØRPK

The Central Iowa Technical Society (CITS), with the help of many midwest packet radio operators, has completed testing of terminal node controller (TNC) software destined to be part of the next Shuttle Amateur Radio Experiment (SAREX-2). This major component of our next manned amateur radio operation in space has proven to have the potential of thousands of packet radio QSOs with groundstations around the world.

Software was written by Howard Goldstein, N2WX, of Palm Bay, FL and tested in a Tucson Amateur Packet Radio Corporation (TAPR) TNC-2 (rev. 2). It follows SAREX-2 system architecture developed by a team led by Dr. Tom Clark, W3IWI, of the Radio Amateur Satellite Corporation (AMSAT). CITS members provided an intensive test environment by flying the SAREX-2 packet radio system in an aeronautical mobile operation thereby allowing groundstations in several midwest states to provide a significant load test.

Several new packet radio operating capabilities are available in Howard's SAREX-2 TNC2 software which required evaluation under load:



AMSAT President Emeritus Tom Clark, W3IWI, accepts AMSAT 1985 Technical Achievement Award for his pioneering tracking algorithms.



Engineering VP Jan King, W3GEY, told the 1985 Space Symposium of next generation satellite program prospects.

— A "ROBOT" capability allows up to nine simultaneous packet radio QSOs with ground-stations with each QSO meeting amateur radio requirements for information transfer and acknowledgement.

— The SAREX-2 operator can create "META" beacons containing up to seven packets of up to 255-bytes of text each allowing up to 1785- bytes of bulletin information to be repeatedly transmitted on the downlink every 215-seconds.

— HEARD beacons containing up to 25 callsigns from monitored packets (which can be used by groundstations to immediately determine if their packets are being copied in the shuttle and will be used by the SAREX-2 logging scheme to develop a list of all stations HEARD during the mission).

— WORKED beacons containing up to 17 callsigns and QSO serial numbers of stations with whom successful QSOs have been made (which can be used by groundstations to determine if they have just completed a successful QSO and will be used by the SAREX-2 logging scheme to develop a list of all stations WORKED during the mission).

Through the efforts of Tom Clark in Washington, D.C. and TAPR in Tucson, AZ, PROMs containing Howard's SAREX-2 TNC2 program were received in Iowa a few days after Howard released his code. Ten Des Moines area packeteers performed a limited test soon after which yielded over 400 ROBOT QSOs in one hour. This initial operation prepared the group for the more intense aeronautical test which followed.

On Wednesday, December 11th, CITS members Larry Vandewater, NØBKB, Rich Amundson, WAØJFS, and Ray Knapp, WA2GTM, were off the ground with the SAREX-2 system shortly after 1900CST. At the same time, Ralph Wallio, WØRPK, opened information nets on 3857 and 1955 KHz to announce test progress and answer operating questions. A UHF-FM link was maintained with the aircraft which proved its value toward the end of the flight.

The first SAREX-2 QSO occurred almost immediately and load increased as the aircraft gained altitude. Although the SAREX-2 software allowed nine simultaneous QSOs, several groundstations reported receiving BUSY responses to their CONNECT attempts. Obviously, this was a very busy system.

During this one-hour test several groundstations collected packets heard on the "downlink" frequency into disk files which, at the end, contained approximately 154K-bytes of packets. A sample showing ROBOT QSO packets (created as QSOs occurred), META beacon packets (transmitted every 215-seconds), a HEARD beacon packet, a WORKED beacon packet and a BEACON TEXT packet (all transmitted every 60-seconds) follows:

N0BKB-1 > K0CY:#0155— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > N0CKN:#0153— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > K0NCR:#015B— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > K0OJ:#0159— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > WORLD:THIS IS A SAREX-2 "META BEACON" WHICH WILL BE USED TO DOWNLINK LENGTHY BULLETINS FROM THE SHUTTLE TO GROUNDSTATIONS. IT CAN HOLD UP TO 7-PACKETS EACH CONTAINING UP TO 255/BYTES FOR A TOTAL OF 1785 BYTES OF INFO. N0BKB-1 > WORLD:THE SAREX-2 SYSTEM ALSO TRANSMITS HEARD BEACONS CONTAINING UP TO THE LAST 25-CALLS FROM PACKETS SEEN (BUT NOT WORKED) AND WORKED BEACONS CONTAINING UP TO THE LAST 17-CALLS AND QSO SERIAL NUMBERS OF STATIONS SUCCESSFULLY QSOED.

N0BKB-1 > WORLD:THIS SAREX-2 LOAD TEST IS SPONSORED BY THE CENTRAL IOWA TECHNICAL SOCIETY AS PART OF THE NATIONWIDE SAREX-2 PROJECT. IT IS INTENDED TO PROVE WE HAVE THE ABILITY TO MAKE THOUSANDS OF PACKET RADIO QSOs WHILE OPERATING ABOARD THE SHUTTLE.

N0BKB-1 > WORLD:THIS SAREX-2 TEST CONFIGURATION INCLUDES A TAPR TNC2, A TANDY TRS-80 M-100 AND A 2M XCVR DRIVING A 1/4-WAVE ANTENNA ON THE FUSELAGE. THE AIRCRAFT IS A CESSNA 182 AT FL010 OVER GREENFIELD, IA WITH N0BKB, WA0JFS AND WA2GTM ABOARD.

N0BKB-1 > WORLD:HF NETS ARE BEING RUN BY W0RPK ON 3857 AND 1955KHZ FOR FURTHER QUESTIONS. WE ARE MAINTAINING A UHF INTERCOM LINK WITH W0RPK. PLEASE CONSIDER A DONATION TO CITS C/O WA0JFS TO HELP DEFRAY EXPENSES.

N0BKB-1 > NF0N:#015F— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > N0APC:#015E— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > K0SEG:#0156— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > N0AN:#0160— Thanks for your help with CITS SAREX-2 load testing

N0BKB-1 > HEARD:0027 K0QVF N0CKN K0DOJ W0QWK N0GGU K0CY N0EKP W0BQY K0OX W0UIZ N0CWR K0YI NF0N K0OJ N0APC K0SEG K0NCR W0NMW N0AN W0CSG N0GHI N0GHP N0BKB-1 > WORKED:W0QWK/0108 N0GGU/00FD K0CY/00F0 NF0N/00D9 W0BQY/008D W0UIZ/0088 N0APC/0078 K0YI/0073 K0SEG/006E NF0N/004F K0OJ/0030 K0NCR/0014 W0NMW/000A N0GHI/000B N0CKN/0005 N0AN/0001

N0BKB-1 > SAREX2:CITS SAREX-2 LOAD TEST

TX 144.950 RX 145.550

PLEASE CONNECT FOR AS MANY QSO'S AS POSSIBLE RESULTS IN HEARD AND WORKED

During a measured hour of this test, the system allowed 502 successful QSOs which is considered to be near its maximum capability. Stations completing QSOs included (with serial number):



Chairman John Browning, W6SP, addresses the 1985 AGM in Vail 9 Nov. 85.

N0AN/0001 (IA)	N0GGU/00FD (MO)	W0BQY/008D (NE)
N0PC/0078 (IA)	N0GHI/000B (IA)	W0QWK/0108 (MO)
K0BOY/01D1 (NE)	NF0N/004F (NE)	K0SEG/006E (IA)
N0CKN/0005 (IA)	K0NCR/0014 (NE)	W0UIZ/0088 (IA)
W0CSG/0000 (IA)	W0NMW/000A (IA)	W0XK/01C3 (MO)
K0CY/00F0 (IA)	K0OJ/0030 (IA)	K0YI/0073 (IA)
K0DOJ/010B (IA)	K0OX/0089 (IA)	

Additionally, HEARD beacons noted packets copied from N0CWR (KS), N0EKP (MO), N0GHP (IA) and K0QVF (IA).

Toward the end of the first hour of what was supposed to be a two-hour mission, the aircraft developed mechanical problems. The two highly qualified pilots aboard decided to reduce altitude which meant the flight never made it to 10,000 feet. Unfortunately, this reduced the operating range to approximately 175 miles eliminating participation by expectant packet radio operators in the larger but more distant metropolitan areas of Minneapolis - St. Paul, Chicago and St. Louis.

As the aircraft descended toward the Greenfield airport, the mechanical problem became more serious finally resulting in a dead-stick landing with the prop totally stopped (the last UHF-FM transmission heard was "... we are a glider").

The landing was uneventful, albeit quiet, but the end of the landing roll left the aircraft and SAREX-2 test crew a long way from the hanger on a cold Iowa night. Fortunately, the aircraft was equipped with several forms of two-way radio and a Greenfield police vehicle was soon on the scene. It was a few days before the news was out that a 3/4"-hole was burned into the wall of a cylinder allowing an almost total loss of oil and causing total failure of the engine.



Space Symposium Moderator and Operations VP Julian Macassey, N6ARE, kept the session moving with entertaining quips and anecdotes.

Work Continues On SAREX II

A Status Report by Tom Clark, W3IWI

Many are aware that we are hard at work to get SAREX II ready for a possible Spring, 1986, shuttle flight. SAREX II is an acronym for Shuttle Amateur Radio Experiment; SAREX I was the slow-scan TV that WØORE used last year. SAREX II is to be a packet-radio package consisting of a flight-hardened TAPR TNC 2 coupled to a Radio Shack Model-100 lap-top computer and the same Motorola "MX" series HT used on previous Amateur Radio shuttle flights. With NASA approval, we will have this hardware carried by Ron Parise, WA4SIR, when he flies on mission 61-E taking off March 6, 1986. The crew working on hardware and software to make this happen are located in Maryland, Arizona, Florida, Texas, Arizona and Iowa. We now have prototype SAREX II software operating on 145.05 in the Balto/Wash area under the call W3IWI-5. It is under test to see if local users can make it croak! It has several unique features:

ROBOT—This is an automatic QSO machine that will work you and assign you a unique serial number (in hex) for your QSO, and then disconnect.

WORKED beacon—If you successfully complete a QSO, your call and serial number will appear at the top of the "WORKED" beacon list. For local testing this (and other) beacons are being sent every 15 minutes. In flight they will be repeated every 15 seconds or so.

HEARD beacon—This beacon begins with a beacon sequence number (to help piece the log together in flight) and lists the calls heard most recently.

A normal beacon (currently addressed to SAREX II) is also used to send a brief (up to 120 bytes) information packet.

A "meta-beacon" is also available (but is currently turned off) to send up to 1.7 kbytes (7 * 255 bytes) of information. It is planned that this feature will be used in flight to downlink a mission status bulletin every couple of minutes or so.

These features have been designed to permit a large number of packeteers to experience the thrill of space communications even if WA4SIR is not personally available.

During the mission, some time will be reserved for special packet tests including an orbital demo of store-and-

forward communications (a la PACSAT); software to support this special mode is to be housed in the Model 100. The ROBOT supports multiple QSO's simultaneously. Balto/Wash users are invited to become abusers and to try to crash the test software. Gang up on W3IWI-5 will also continue to serve as a local coverage digipeater from its location at NASA/Goddard in Greenbelt, Maryland.

Reports on how it works will be appreciated. Especially solicited are bug reports which should contain as much info as possible on what happened. It's a lot easier to fix it on the ground than when it is flying in orbit!

Sidereal Times For Your Tracking Program

Some orbital prediction programs, especially the earlier ones, require a revision to the table of sidereal times. The following were recently supplied by W3IWI:

1985 0.27668226 (Provided for reference purposes only)
 1986 0.27601916
 1987 0.27535606
 1988 0.27469296
 1989 0.27676777

Users should replace prior year tables in the program with values for 1986 on. Not all programs require updates. Some compute the tables internally and others have tables running for 10 or more years into the future.

Users of the AMS-81 Timex-Sinclair program should send a business-sized SASE to WØRPK for update instructions. His address is: Ralph Wallio, WØRPK, RR#4, Indianola, IA 50125

Bob Rogers, W8JLE, advises that all versions of the W3IWI program running on the Radio Shack computers, except the Model 4 QUIKTRAK, require updates. The data statements can be found beginning on line 980 or 990 depending on the model.

None of the versions of QUIKTRAK, the VR-85 or WØSL programs require updates.



AMSAT DL President Karl Meinzer, DJ4ZC, explains the possible follow-on options to Phase 3C to the Space Symposium. Phase 3D would be an up-scale super-satellite, Karl said.

Orbit Predictions

By KA9Q

Satellite OSCAR-9
 Catalog number 12888
 Epoch time: 85364.96634415
 Mon Dec 30 23:11:32.134 1985 UTC
 Element set: 833
 Inclination: 97.6456 deg
 RA of node: 357.4198 deg
 Eccentricity: 0.0001475
 Arg of perigee: 337.3089 deg
 Mean anomaly: 22.8087 deg
 Mean motion: 15.27908552 rev/day
 Decay rate: 1.245e-05 rev/day²
 Epoch rev: 23527
 Semi major axis: 6857.168 km
 Anom period: 94.246478 min
 Apogee: 483.160 km
 Perigee: 481.138 km
 Ref perigee: 2920.96219747
 Mon Dec 30 23:05:33.861 1985 UTC
 Beacon: 145.8250 MHz

Satellite OSCAR-10
 Catalog number 14129
 Epoch time: 86003.62596023
 Fri Jan 3 15:01:22.963 1986 UTC
 Element set: 220
 Inclination: 26.4408 deg
 RA of node: 101.5132 deg
 Eccentricity: 0.5984095
 Arg of perigee: 74.8856 deg
 Mean anomaly: 340.8663 deg
 Mean motion: 2.05861262 rev/day
 Decay rate: -7.7e-07 rev/day²
 Epoch rev: 1927
 Semi major axis: 26105.021 km
 Anom period: 699.500229 min
 Apogee: 35352.320 km
 Perigee: 4109.335 km
 Ref perigee: 2924.65177818
 Fri Jan 3 15:38:33.635 1986 UTC
 Translate freq: 581.0047 MHz
 Invert: 1
 Beacon: 145.8100 MHz

Satellite OSCAR-11
 Catalog number 14781
 Epoch time: 85365.23397724
 Tue Dec 31 05:36:55.633 1985 UTC
 Element set: 108
 Inclination: 98.1697 deg
 RA of node: 69.3704 deg
 Eccentricity: 0.0013321
 Arg of perigee: 335.7134 deg
 Mean anomaly: 24.3445 deg
 Mean motion: 14.62015712 rev/day
 Decay rate: 8.4e-07 rev/day²
 Epoch rev: 9782
 Semi major axis: 7061.886 km
 Anom period: 98.494154 min
 Apogee: 696.693 km
 Perigee: 677.879 km
 Ref perigee: 2921.22935187
 Tue Dec 31 05:30:16.1 1985 UTC
 Beacon: 145.8260 MHz

Satellite RS-5
 Catalog number 12999
 Epoch time: 85361.53657008
 Fri Dec 27 12:52:39.654 1985 UTC
 Element set: 288
 Inclination: 82.9739 deg
 RA of node: 199.8870 deg
 Eccentricity: 0.0009223
 Arg of perigee: 35.4765 deg
 Mean anomaly: 324.6917 deg
 Mean motion: 12.05062652 rev/day
 Decay rate: 4e-08 rev/day²
 Epoch rev: 17719
 Semi major axis: 8033.798 km
 Anom period: 119.495862 min
 Apogee: 1670.158 km
 Perigee: 1655.339 km
 Ref perigee: 2917.54470896
 Fri Dec 27 13:04:22.854 1985 UTC

Satellite RS-7
 Catalog number 13001
 Epoch time: 86002.54707327
 Thu Jan 2 13:07:47.130 1986 UTC
 Element set: 232
 Inclination: 82.9595 deg
 RA of node: 190.8840 deg
 Eccentricity: 0.0022060
 Arg of perigee: 306.1353 deg
 Mean anomaly: 53.7673 deg
 Mean motion: 12.08693755 rev/day
 Decay rate: 3e-08 rev/day²
 Epoch rev: 17845
 Semi major axis: 8017.690 km
 Anom period: 119.136878 min
 Apogee: 1670.971 km
 Perigee: 1635.597 km
 Ref perigee: 2923.53471666
 Thu Jan 2 12:49:59.519 1986 UTC

OSCAR-9
 Mon Jan 20 00:08:56.258 1986 UTC:
 Ascending node at -103.3
 Nodal period: 94.30369 min
 Longitude increment:
 23.573227 deg w/orbit
 Element set 833, epoch:
 Mon Dec 30 23:11:32.134 1985 UTC

OSCAR-11
 Mon Jan 20 00:18:37.169 1986 UTC:
 Ascending node at -34.8
 Nodal period: 98.55253 min
 Longitude increment:
 24.637865 deg w/orbit
 Element set 108, epoch:
 Tue Dec 31 05:36:55.633 1985 UTC

RS-5
 Mon Jan 20 00:45:57.769 1986 UTC:
 Ascending node at 56.5
 Nodal period: 119.55229 min
 Longitude increment:
 30.014955 deg w/orbit
 Element set 288, epoch:
 Fri Dec 27 12:52:39.654 1985 UTC

RS-7
 Mon Jan 20 00:17:35.390 1986 UTC:
 Ascending node at 57.8
 Nodal period: 119.19346 min
 Longitude increment:
 29.925274 deg w/orbit
 Element set 232, epoch:
 Thu Jan 2 13:07:47.130 1986 UTC



Mike Crisler, N4IFD, now AVP for Field Operations, accepts the award as 1985's Outstanding Area Coordinator.

Amateur Satellite Report is published and mailed First Class bi-weekly for the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are \$22.00; Foreign is \$30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only please) to "Satellite Report," 221 Long Swamp Road, Wolcott, CT 06716. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Wolcott, CT 06716. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.